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CHARTING THE DIGITAL FUTURE BROADCASTING

Final Report
of the Advisory Committee on
Public Interest Obligations of Digital
Television Broadcasters

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December 18, 1998
Washington, D.C.

December 18, 1998

The Vice President
The White House
Washington, DC 20500

Dear Mr. Vice President:

It is with pleasure that we submit to you the Final Report of the Advisory Committee on Public Interest Obligations of Digital Television Broadcasters. The Advisory Committee's Report represents 15 months of intensive work and embodies the collective efforts of numerous individuals in the television industry, public interest community, and the general public.

Digital broadcast television is now a reality. In many areas of the country, the first digital broadcast signals were transmitted just before the Advisory Committee completed its deliberations, and the promise of a new and exciting digital future is here. It is a timely moment, therefore, for you, as well as Congress, the Federal Communications Commission, the telecommunications industry, and the public to consider how the public interest will be best served as we experience the implementation of digital television.


The enclosed Report has several sections. It includes a history of our Advisory Committee, a history of public interest obligations and broadcasting, an account of the genesis of digital television, the Advisory Committee's recommendations and supporting material, and individual views of many of our members. The recommendations reflect a broad consensus of our Advisory Committee, cutting across all lines and including the overwhelming majority of our members.

We are also pleased to report that the Benton Foundation has offered to serve as a home of the Advisory Committee legacy, acting as our institutional memory and tracking the debate on and progress of the Advisory Committee's report and recommendations.

On behalf of the entire Advisory Committee, we want to thank you and the President for the opportunity to serve the public through this Advisory Committee, and for the honor of transmitting to you the Final Report of the Advisory Committee on Public Interest Obligations of Digital Television Broadcasters, pursuant to Section 2 of Executive Order No. 13038 of March 11, 1997.

Respectfully submitted,


Leslie Moonves
Co-Chair


Norman Ornstein
Co-Chair

Advisory Committee on Public Interest Obligations of Digital Television Broadcasters

Leslie Moonves, Co-Chair
President and CEO
CBS Television

Norman J. Ornstein, Co-Chair
Resident Scholar
American Enterprise Institute

Charles Benton
Chairman & CEO
Benton Foundation and Public
Media, Inc.

Frank M. Blythe
Executive Director
Native American Public
Telecommunications, Inc.

Peggy Charren
Visiting Scholar, Harvard
University Graduate School of
Education; Founder, Action for
Children's Television

Harold C. Crump
Vice President
Hubbard Broadcasting, Inc.

Frank H. Cruz
Vice Chairman
Corporation for Public
Broadcasting

Robert W. Decherd
Chairman of the Board,
President and CEO
A.H. Belo Corporation

Barry Diller
Chairman and CEO
USA Networks, Inc.

William F. Duhamel, Ph.D.
President
Duhamel Broadcasting Enterprises

Robert D. Glaser
Chairman and CEO
RealNetworks, Inc.

James F. Goodman
President and CEO
Capitol Broadcasting Company

Paul A. La Camera
President and General Manager
WCVB-TV

Richard Masur
President
Screen Actors Guild

Newton N. Minow
Professor, Communications Policy
and Law, Northwestern University;
Counsel, Sidley & Austin

Jose Luis Ruiz
Independent Producer

Shelby Schuck Scott
President, American Federation of
Television and Radio Artists

Gigi B. Sohn
Executive Director
Media Access Project

Karen Peltz Strauss
Legal Counsel for
Telecommunications Policy
National Association for the Deaf

Cass R. Sunstein
Karl N. Llewellyn Distinguished Service
Professor of Jurisprudence
University of Chicago Law School

Lois Jean White
President
National Parents Teacher Association

James Yee
Executive Director
Independent Television Service

Acknowledgments

The work of the Advisory Committee on Public Interest Obligations spanned 15 months, covered a broad range of diverse and complicated issues, and required the assistance of many people. The Advisory Committee wishes to thank all the individuals and organizations across the country who participated in its work. Without all of you, the Advisory Committee could not have discharged its mandate so ably.

The Advisory Committee offers special thanks to the Department of Commerce's National Telecommunications and Information Administration (NTIA). Thanks to the generosity and efforts of Secretary of Commerce William M. Daley and Assistant Secretary for Communications and Information Larry Irving, NTIA provided the home, and logistical and staff support for the Advisory Committee, under the able and indefatigable leadership of Karen M. Edwards, and with the help of Anne Stauffer, Sandra Laousis, and Sheree Stalling. We would never have been able to discharge our responsibilities without their efforts, which were a model for public service. Likewise, we offer thanks to David Bollier, who assisted the Advisory Committee in drafting, under severe time pressures, some of the materials for our Final Report, and to Jonathan Cohen, who gave invaluable assistance in the early stages of our deliberations.

The Advisory Committee also thanks its members whose companies and organizations made staff members available to assist Advisory Committee members and provided financial resources to support the Advisory Committee's work. Several members were also instrumental in helping to plan and coordinate Advisory Committee meetings held in various parts of the country. Staff members who supported the members of the Advisory Committee are listed below.

Finally, the Advisory Committee is indebted to the people who testified during the fact-finding phase of its work. These broadcasters, educators, programmers, attorneys, and advocates—from the CEOs to the parents—provided much of the factual predicate on which the Advisory Committee's Final Report is based. The Advisory Committee also thanks all the individuals and organizations who followed its work closely and submitted thoughtful comments on how digital television broadcasters could serve the public interest.

Staff of the Advisory Committee

Staff Assistants to Advisory Committee Members

Victoria Duran
National Parents Teacher Association

Julius Genachowski
USA Broadcasting, Inc.

Michael J. McCarthy
A. H. Belo Corporation

Regina Sullivan
A. H. Belo Corporation

Kevin Taglang
Benton Foundation

Secretariat

Karen M. Edwards
Designated Federal Officer

Anne Stauffer
Committee Liaison Officer

Sandra Laousis
Executive Assistant

Sheree Stalling
Administrative Assistant

Editorial Staff

David Bollier
Joseph Foote
Norcott & Company

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Executive Summary

As this Nation's 1,600 television stations begin to convert to a digital television format, it is appropriate to reexamine the long-standing social compact between broadcasters and the American people. The quality of governance, intelligence of political discourse, diversity of free expression, vitality of local communities, opportunities for education and instruction, and many other dimensions of American life will be affected profoundly by how digital television evolves.

This Advisory Committee's recommendations on how public interest obligations of television broadcasters ought to change in the new digital television era represent a new stage in the ongoing evolution of the public interest standard: a needed reassessment in light of dramatic changes in communications technology, market structures, and the needs of a democratic society.

SECTION I.

THE ORIGINS AND FUTURE PROSPECTS OF DIGITAL TELEVISION

Digital television is a new technology for transmitting and receiving broadcast television signals. It delivers better pictures and sound, uses the broadcast spectrum more efficiently, and adds versatility to the range of applications. Often referred to as DTV, digital television also represents a new technological infrastructure for broadcast television, and thus a new economic and competitive paradigm.

Using an additional 6 megahertz (MHz) of broadcast spectrum temporarily granted by Congress and the Federal Communications Commission (FCC) for a period of no fewer than 9 years, broadcasters will be able to develop a diverse range of new digital television programming and services while continuing to transmit conventional analog television programming on their existing allotments of spectrum, as required by the Telecommunications Act of 1996.

One of the primary rationales for the Nation's transition to digital television is high-definition television, or HDTV. This transmission mode contains up to six times more data than con-

ventional television signals and at least twice the picture resolution. But DTV also enables a broadcast station to send as many as five digital "standard-definition television" (SDTV) signals, which are not as sharp as HDTV but still superior to existing television images. This new capacity, known as "multicasting" or "multiplexing," is expected to allow broadcasters to compete with other multichannel media such as cable and direct broadcast satellite systems.

Another DTV capability is the ability to provide new kinds of video and data services, such as subscription television programming, computer software distribution, data transmissions, teletext, interactive services, and audio signals, among others. Referred to as "ancillary and supplementary services" under the Telecommunications Act of 1996, these services include such potentially revenue-producing innovations as providing stock prices and sports scores, classified advertising, paging services, "zoned" news reports, advertising targeted to specific television sets, "time-shifted" video programming, and closed-circuit television services.

These choices—HDTV, SDTV, and innovative video/information services—are not mutually exclusive. Within a single programming day, a broadcaster will have the flexibility to shift back and forth among different DTV modes in different day parts. Although many existing programming genres and styles will surely continue, innovations in video programming and information services will arise, fueled in no small part by the anticipated convergence of personal computer and television technologies.

SECTION II.

THE PUBLIC INTEREST STANDARD IN TELEVISION BROADCASTING

Federal oversight of all broadcasting has had two general goals: to foster the commercial development of the industry and to ensure that broadcasting serves the educational and informational needs of the American people. In many respects, the two goals have been quite complementary, as seen in the development of network news operations and in the variety of cultural, educational, and public affairs programming aired over the years.

In other respects, however, Congress and the Federal Communications Commission have sometimes concluded that the broadcast marketplace by itself is not adequately serving public needs. Specific policies have sought to foster diversity of programming, ensure candidate access to the airwaves, provide diverse views on public issues, encourage news and public affairs programming, promote localism, generate more educational programming for children, and sustain a separate realm of noncommercial television programming services.

The fundamental legal framework that still governs the broadcast industry, based on the notion of "spectrum scarcity," sets it apart from other media. Congress has mandated that licensees serve as "public trustees" of the airwaves. Broadcasters have affirmative statutory and regulatory obligations to serve the public in specific ways. The U.S. Supreme Court has upheld the public trustee basis of broadcast regulation as constitutional.

SECTION III.

RECOMMENDATIONS OF THE ADVISORY COMMITTEE

The vast new range of choices inherent in digital television technology makes it impossible to transfer summarily existing public interest obligations to digital television broadcasting. A key mandate for the Committee, therefore, has been to suggest how traditional principles of public-interest performance should be applied in the digital era. A second mandate has been to consider what additional public interest obligations may be appropriate, given the enhanced opportunities and advantages that broadcasters may receive through digital broadcasting.

Mindful of the uncertainties in how digital television will evolve, the Advisory Committee has operated under several basic principles in formulating its recommendations. The first is that the public, as well as broadcasters, should benefit from the transition to digital television. Second, flexibility is critical to accommodate unforeseen economic and technological developments. Third, the Advisory Committee has favored, whenever possible, policy approaches that rely on information disclosures, voluntary self-regulation, and economic incentives, as opposed to regulation.

The Advisory Committee recommends:

- **Disclosure of Public Interest Activities by Broadcasters**

Digital broadcasters should be required to make enhanced disclosures of their public interest programming and activities on a quarterly basis, using standardized checkoff forms that reduce administrative burdens and can be easily understood by the public.

- **Voluntary Standards of Conduct**

The National Association of Broadcasters, acting as the representative of the broadcasting industry, should draft an updated voluntary Code of Conduct to highlight and reinforce the public interest commitments of broadcasters.

- **Minimum Public Interest Requirements**

The FCC should adopt a set of minimum public interest requirements for digital television broadcasters in the areas of community outreach, accountability, public service announcements, public affairs programming, and closed captioning.

- **Improving Education Through Digital Broadcasting**

Congress should create a trust fund to ensure enhanced and permanent funding for public broadcasting to help it fulfill its potential in the digital television environment and remove it from the vicissitudes of the political process.

When spectrum now used for analog broadcasting is returned to the government, Congress should reserve the equivalent of 6 MHz of spectrum for each viewing community in order to establish channels devoted specifically to noncommercial educational programming. Congress should establish an orderly process for allocating the new channels as well as provide adequate funding from appropriate revenue sources.

Broadcasters that choose to implement datacasting should transmit information on behalf of local schools, libraries, community-based nonprofit organizations, governmental bodies, and public safety institutions. This activity should count toward fulfillment of a digital broadcaster's public interest obligations.

- **Multiplexing and the Public Interest**

Digital television broadcasters who choose to multiplex, and in doing so reap enhanced economic benefits, should have the flexibility to choose between paying a fee, providing a multicasted channel for public interest purposes, or making an in-kind contribution. Given the uncertainties of this still-hypothetical market, broadcasters should have a 2-year moratorium on any fees or contributions to allow for experimentation and innovation. Small-market broadcasters should be given an opportunity to appeal to the FCC for additional time. The moratorium should begin after the market penetration for digital television reaches a stipulated threshold.

- **Improving the Quality of Political Discourse**

If Congress undertakes comprehensive campaign finance reform, broadcasters should commit firmly to do their part to reform the role of television in campaigns. This could include repeal of the "lowest unit rate" requirement in exchange for free airtime, a broadcast bank to distribute money or vouchers for airtime, and shorter time periods of selling political airtime, among other changes.

In addition, the television broadcasting industry should voluntarily provide 5 minutes each night for candidate-centered discourse in the 30 days before an election. Finally, blanket bans on the sale of airtime to all State and local political candidates should be prohibited.

- **Disaster Warnings in the Digital Age**

Broadcasters should work with appropriate emergency communications specialists and manufacturers to determine the most effective means to transmit disaster warning information. The means chosen should be minimally intrusive on bandwidth and not result in undue additional burdens or costs on broadcasters. Appropriate regulatory authorities should also work with manufacturers of digital television sets to make sure that they are modified to handle these kinds of transmissions.

- **Disability Access to Digital Programming**

Broadcasters should take full advantage of new digital closed captioning technologies to provide maximum choice and quality for Americans with disabilities, where doing so would not impose an undue burden on the broadcasters. These steps should include the gradual expansion of captioning on public service announcements, public affairs programming, and political programming; the allocation of sufficient audio bandwidth for the transmission and delivery of video description; disability access to ancillary and supplementary services; and collaboration between regulatory authorities and set manufacturers to ensure the most efficient, inexpensive, and innovative capabilities for disability access.

- **Diversity in Broadcasting**

Diversity is an important value in broadcasting, whether it is in programming, political discourse, hiring, promotion, or business opportunities within the industry. The Advisory Committee recommends that broadcasters seize the opportunities inherent in digital television technology to substantially enhance the diversity available in the television marketplace. Serving diverse interests within a community is both good business and good public policy.

- **New Approaches to Public Interest Obligations in the New Television Environment**

Although the Advisory Committee makes no consensus recommendation about entirely new models for fulfilling public interest obligations, it believes that the Administration, the Congress, and the FCC should explore alternative approaches that allow for greater flexibility and efficiency while affirmatively serving public needs and interests.

Finally, some members of the Advisory Committee have submitted separate statements that supplement, modify, or dissent from the Committee's recommendations. These statements are provided in Section IV of the Report.

Introduction

As this Nation's 1,600 television stations begin to convert to a digital television format, it is appropriate to reexamine the longstanding social compact between broadcasters and the American people. In the words of Vice President Al Gore, this coming transition represents "the greatest transformation in television's history...one that is truly bigger than the shift from black and white to color....It's like the difference between a one-man band and a symphony."¹

The quality of governance, intelligence of political discourse, diversity of free expression, vitality of local communities, opportunities for education and instruction, and many other dimensions of American life will be affected profoundly by how digital television evolves. As a free and ubiquitous medium, over-the-air television has been and will continue to be a central, defining force in American society. Thus, the American people have a vital stake in the character of television in the new digital era.

Much remains unknown about the future of digital television, which is precisely why President Clinton established the Advisory Committee on Public Interest Obligations of Digital Television Broadcasters. It is important to help affirmatively *shape* the new digital television era, in concert with market forces and the technology itself, by recommending appropriate legal obligations and marketplace rules.

Acting on behalf of the American public, this is a role the Federal Government has played since the inception of broadcasting. As decreed by Congress, and affirmed by the Supreme Court, the airwaves are a public resource legally owned by the American people.² Broadcasters are licensed to use those airwaves, acting as fiduciaries for the public good, and the Congress and the Federal Communications Commission are authorized to ensure that broadcasters fulfill this function.

The framework for broadcasting was first articulated by Herbert Hoover when he was serving as Secretary of Commerce in the 1920s. "The ether is a public medium, and its use must be for a public benefit," Hoover said. "The dominant element for consideration in the radio field is, and always will be, the great body of the listening public, millions in number, country-wide in distribution."³

This principle is the golden thread that has run through more than seven decades of broadcasting. It was enshrined in the Radio Act of 1927 and the Communications Act of 1934 in the mandate that broadcasting serve the “public interest, convenience and necessity.”⁴ It has been elaborated on through numerous FCC regulations designed to enhance diversity of expression, political discourse, children’s programming, and other important cultural functions. And it has been reaffirmed by Supreme Court rulings that balance the First Amendment rights of speakers and viewers/listeners in broadcasting.⁵ The specific public interest obligations of television broadcasters have varied over time, but the principles of public interest service have been, and remain, central to the defining charter of broadcasting.

This Advisory Committee’s recommendations on how public interest obligations of television broadcasters ought to change in the new digital television era—outlined in Section III below—represent a new stage in the ongoing evolution of the public interest standard: a needed reassessment in light of dramatic changes in communications technology, market structures, and the needs of a democratic society.

Before presenting those recommendations, this report reviews the historical events that have brought broadcasting to this point. Section I describes the evolution of digital television technology, while Section II describes the events that have affected the development of the public interest standard since 1927. These histories provide a useful context for understanding the Advisory Committee’s recommendations and how they seek to preserve and extend many well-established principles in the new media environment. They also shed light on the special challenges of bringing commercial objectives and public needs into greater alignment in broadcast television, whose free and ubiquitous programming and tradition of public responsibilities make it a very special resource in American society.

ENDNOTES

- ¹ Vice President Al Gore, Address at the inaugural meeting of the Advisory Committee on Public Interest Obligations (Oct. 22, 1997).
- ² See, 47 U.S.C. § 301 (1997); *Federal Communications Comm’n v. Sanders Bros. Radio Station*, 309 U.S. 470, 475 (1939).
- ³ *Proceedings of the Fourth National Radio Conference*, Washington, DC, Nov. 9-11, 1925 (Washington, DC: Government Printing Office, 1926), p. 7.
- ⁴ Radio Act of 1927, Pub. L. No. 632, 44 Stat. 1162, § 4 (1927). See also 47 U.S.C. §§ 307(a), 309(a), 310(d).
- ⁵ See, e.g., *Turner Broad. Sys., Inc. v. FCC*, 512 U.S. 622, 650 (1994), *vacated and remanded*, 910 F. Supp. 734 (1995), *aff’d*, 520 U.S. 180 (1997); *Columbia Broad. Sys., Inc. v. Democratic Nat’l Comm.*, 412 U.S. 94, 117-18 (1973).

Section I.

The Origins and Future Prospects of Digital Television

Digital television is a superior television format that delivers better pictures and sound, uses the broadcast spectrum more efficiently, and adds versatility to the range of applications. Often referred to as DTV,¹ digital television also represents a new technological infrastructure for broadcast television and thus a new economic and competitive paradigm. This new transmission technology invites a broad reassessment of established programming practices, competitive strategies, and regulatory requirements, including the public interest obligations that have always been considered fundamental to broadcast television in this country.

To understand fully the new framework of legal and technical standards that will guide the development of digital television—and thus the likely business models and most appropriate public interest standards—it is important to understand the evolution of digital television over the past 11 years. This section recounts that history. It also explains the statutory and regulatory standards that will govern DTV, barriers that may impede implementation of the new technology, and unresolved policy issues that require action by the Federal Communications Commission (FCC) and Congress.

WHAT IS DIGITAL TELEVISION?

Digital television is a new technology for transmitting and receiving broadcast television signals. Using an additional 6 megahertz (MHz) of broadcast spectrum temporarily granted by Congress and the FCC for a period of no fewer than 9 years, broadcasters will be able to develop a diverse range of new digital television programming and services while continuing to transmit conventional analog television programming on their existing allotments of spectrum, as required by the Telecommunications Act of 1996.²

A digital standard is superior to analog because of its greater accuracy, versatility, efficiency, and interoperability with other electronic media. Digital signals also have the advantage of generating no noise or “ghosting,” and being more resistant to signal interference. Within the range of the signal, this results in a perfect signal.

One of the primary rationales for the Nation's transition to digital television is high-definition television, or HDTV. This transmission standard contains up to six times more data than conventional television signals and at least twice the picture resolution. HDTV images have a 16-to-9 aspect ratio (the ratio of width to height), providing a wider image than the 4-to-3 ratio that has characterized television since 1941. This higher resolution and different aspect ratio makes HDTV images substantially more vivid and engaging than the images produced by the existing television format, and that effect is enhanced by five discrete channels of CD-quality audio.

But DTV is not just about HDTV. As a digital (and not analog) signal, DTV enables broadcasters to offer a variety of innovations. Instead of sending an HDTV signal of 19.4 megabits per second, for example, a broadcast station can send as many as five digital "standard-definition television" (SDTV) signals, each of which might consist of 4 to 5 megabits per second. Although SDTV images are not as sharp as HDTV, they are superior to existing television images. This new capacity, known as "multicasting" or "multiplexing," is expected to allow broadcasters to compete with other multichannel media such as cable and direct broadcast satellite systems. Moreover, as new advances in compression technology occur in the years ahead, broadcast stations are expected to fit even more SDTV signals into the same spectrum allotment.

Another DTV capability is the ability to provide new kinds of video and data services, such as subscription television programming, computer software distribution, data transmissions, teletext, interactive services, and audio signals, among others. Referred to as "ancillary and supplementary services" under the Telecommunications Act of 1996, these services include such potentially revenue-producing innovations as stock prices, sports scores, classified advertising, paging services, "zoned" news reports, advertising targeted to specific television sets, "time-shifted" video programming, and closed-circuit television services.

These choices—HDTV, multicasting, and innovative video/information services—are not mutually exclusive. Within a single programming day, a broadcaster will have the flexibility to shift back and forth between different DTV modes in different day parts. During daytime, for example, a station might show four SDTV channels; during primetime, programming might switch to a single HDTV program such as a movie or wide-screen sporting event. Because different gradations of HDTV and SDTV picture resolution are possible—there are 18 different transmission formats—a station can mix and match video programming with data services, provided that the various signals fit within the 6 MHz bandwidth.

All this suggests that over the next 10 to 15 years, DTV will usher in a sweeping transformation of broadcast television—its programming and services, its revenue sources, its ownership structures, and its outside partnerships. Although many existing programming genres and styles will surely continue, innovations in video programming and information services will arise, fueled in no small part by the anticipated convergence of personal computer and television technologies. In addition, broadcast television may develop new services in alliance

with other telecommunications media—a scenario made possible by digital code, which is increasingly becoming the common language for all electronic media.

It is difficult to predict which programming and revenue models broadcasters will choose to develop as they commence DTV transmission. The Telecommunications Act of 1996, which authorized the FCC to give an additional 6 MHz channel to existing broadcasters for digital transmissions, is deliberately flexible.³ Much will depend on the competitive opportunities that broadcasters identify as promising, emerging market conditions, and the regulatory groundrules.

A BRIEF HISTORY OF DIGITAL TELEVISION TECHNOLOGY

For almost 60 years, television broadcasters have transmitted signals based on the “NTSC standard.” This technical format, developed and recommended by the National Television Systems Committee, has remained largely unchanged since it was adopted by the FCC in 1941.⁴ The most significant modifications have been the introduction of color television in 1953; “ghost canceling” provisions to enhance picture clarity; the use of a previously unused portion of the transmission signal called the “vertical blanking interval” to send closed captioning; and stereophonic sound.

Although television engineers had long envisioned ways to upgrade the existing NTSC standard, for many years the broadcast community, Congress, and the FCC showed little interest in undertaking such a large, complex challenge. This view changed in the mid-1980s as Japanese consumer electronics firms forged ahead with the development of HDTV technology, and as the MUSE analog format proposed by NHK, a Japanese company, was seen as a pacesetter that threatened to eclipse U.S. electronics companies. During this period, the FCC considered reassigning some vacant portions of the broadcast spectrum to so-called Land Mobile users—police departments, emergency services, delivery companies, and others. At that point, broadcasters declared their interest in reserving this portion of the spectrum for HDTV.⁵

To explore the issues posed by HDTV, the FCC issued its First Notice of Inquiry on Advanced Television Service in July 1987⁶ and a few months later, appointed a 25-member advisory panel—the Advisory Committee on Advanced Television Service (ACATS). Chaired by former FCC Chairman Richard E. Wiley, ACATS was charged with reviewing the technical issues and recommending an ATV system to the FCC.

The first congressional hearing on HDTV was held in October 1987. This event helped galvanize the ACATS to announce an open competition for development of the best advanced television standard. Until June 1990, the Japanese MUSE standard—based on an analog system—was the front-runner among the more than 23 different technical concepts under consideration. Then, an American company, General Instrument, demonstrated the feasibility of a digital television signal. This breakthrough was of such significance that the FCC was

persuaded to delay its decision on an ATV standard until a digitally based standard could be developed.

In March 1990, when it became clear that a digital standard was feasible, the FCC made a number of critical decisions. First, the Commission declared that the new ATV standard must be more than an enhanced analog signal, but be able to provide a genuine HDTV signal with at least twice the resolution of existing television images.⁷ Then, to ensure that viewers who did not wish to buy a new digital television set could continue to receive conventional television broadcasts, it dictated that the new ATV standard must be capable of being "simulcast" on different channels.⁸

The new ATV standard also allowed the new DTV signal to be based on entirely new design principles. Although incompatible with the existing NTSC standard, the new DTV standard would be able to incorporate many improvements, including:

Progressive scanning, as explained below, is a more demanding technical format than the current "interlaced scanning" that will allow for a smoother sequencing of video picture frames and interactivity between computers and television sets.

Square pixels, or the most basic element of video image data, facilitate the interoperability of the new video standard with other imaging and information systems, including computers. With 1,920 pixels per line displayed on 1,080 lines per frame, the resolution of HDTV images is much sharper than that of the current NTSC format.

Increased frame rates allow a smoother simulation of motion in television signals; the more frames per second, the more realistic the portrayal of motion. The ACATS proposal allowed three different frame rates—24, 30, and 60 frames per second.

Additional lines per frame allow video images to be sharper in resolution. The current NTSC format provides for 525 horizontal lines of picture data; the HDTV standards provide for either 720 or 1080 horizontal lines.

Different aspect ratios give viewers a wider field of view, so that the viewing experience is more encompassing, in the manner of a film. In the existing NTSC format, the aspect ratio, or relation of the width to the height of the screen, is 4-to-3. In HDTV, the aspect ratio is a wider, more rectangular 16 to 9 aspect ratio, which is the same dimensions as 35-millimeter film.

Sound is more vivid in digital television, too, because there are five discrete channels of CD-quality audio, along with a sub-woofer channel for deeper sounds.

Over time, DTV programming is likely to exploit these new capabilities.

Although these technical improvements would help make television programming more appealing, the overarching goal of the ATV standard, the FCC later stated, is to:

promote the success of a *free*, local television service using digital technology. Broadcast television's universal availability, appeal and the programs it provides—for example, entertainment, sports, local and national news, election results, weather advisories, access for candidates and public interest programming such as educational television for children—have made broadcast television a vital service.⁹

By adopting a uniform technical standard rather than leaving the outcome to marketplace competition, the Commission sought to ensure stability and continuity in the broadcast market. Television set manufacturers in particular wanted assurance that any digital television set would work and thus could be sold in all regions of the country.

The Advisory Committee on Advanced Television Service, which was hosting the competition for the best digital standard, decided to collaborate with the Advanced Television Systems Committee (ATSC), an industry group, to recommend a series of technical specifications. By early 1993, after a rigorous technical review of four digital HDTV standards and one analog proposal, this subgroup affirmed the superiority of digital over analog. Still, the ATSC subgroup found that each of the four digital proposals was deficient in some way.

This finding prompted the remaining seven ATV competitors to form a coalition, called the Grand Alliance, to pool their expertise.¹⁰ Working with ACATS, the former competitors agreed in May 1993 jointly to develop a new, multifaceted standard that would incorporate the best of each system. By November 1995, after extensive testing at three laboratories, the ACATS formally recommended a set of prototype DTV protocols—the Grand Alliance standards—to the FCC. Key technical criteria in selecting the final standards were video/audio quality, interoperability with other video delivery media, spectrum efficiency issues, and cost.

In May 1996, the FCC formally proposed adoption of the Grand Alliance standards for terrestrial broadcasting,¹¹ and in December of that year, it adopted them, with some modifications.¹² Neither cable nor direct broadcast satellite transmissions would be directly affected. The standards covered five major technical subsystems: scanning, video compression, audio compression, packetized data transport, and radio-frequency transmission. They included 18 distinct transmission formats, a compromise that satisfied the sometimes-conflicting interests of various industries (broadcasting, television set manufacturers, film studios, and computer and software makers) while ensuring great flexibility in how digital television could be used.

The final standard adopted by the FCC did not require a single standard for scanning formats, aspect ratios, or lines of resolution. This outcome resulted from a dispute between the consumer electronics industry (joined by some broadcasters) and the computer industry (joined by the film industry and some public interest groups) over which of the two scanning processes—interlaced or progressive—is superior. Interlaced scanning, which is used in televisions worldwide, scans even-numbered lines first, then odd-numbered ones. Progressive scanning, which is the format used in computers, scans lines in sequences, from top to bottom.

The computer industry argued that progressive scanning is superior because it does not “flicker” in the manner of interlaced scanning. It also argued that progressive scanning enables easier connections with the Internet, and is more cheaply converted to interlaced formats than vice versa. The film industry also supported progressive scanning because it offers a more efficient means of converting filmed programming into digital formats. For their part, the consumer electronics industry and broadcasters argued that interlaced scanning was the only technology that could transmit the highest quality pictures then (and currently) feasible, i.e., 1,080 lines per picture and 1,920 pixels per line. Broadcasters also favored interlaced scanning because their vast archive of interlaced programming is not readily compatible with a progressive format.

In the end, the FCC acknowledged but did not adopt any of the 18 recommended formats; broadcasters may choose the scanning format that best suits their needs. Of the 18 formats, 6 are HDTV formats—3 of which are based on progressive scanning and 3 on interlaced scanning. Of the remaining formats, 8 are SDTV (4 wide-screen formats with 16 to 9 aspect ratios, and four conventional 4 to 3 aspect ratios), and 4 are VGA (formats that are of lower quality than the current analog NTSC standard; VGA stands for Video Graphics Array Adaptor). A key rationale for adopting so many formats was to allow broadcasters to explore what works best for them in the marketplace. “We anticipate that stations may take a variety of paths,” the FCC said in its April 1997 *Fifth Report and Order on ATV*.¹³

[S]ome may transmit all or mostly high resolution television programming, others a smaller amount of high resolution television, and yet others may present no HDTV, only SDTV, or SDTV and other services. We do not know what consumers may demand and support. Since broadcasters have incentives to discover the preferences of consumers and adapt their service offerings accordingly, we believe it is prudent to leave the choice up to broadcasters so that they may respond to the demands of the marketplace. A requirement now could stifle innovation as it would rest on a priori assumptions as to what services viewers would prefer.¹⁴

In this same report, the Commission also established a tentative 8-year transition schedule for moving from the current NTSC standard to DTV.

HOW DIGITAL TELEVISION WILL EVOLVE: THE PLAN

From 1994 to 1995, while ACATS wrestled with technical challenges and interindustry disagreements, Congress debated legislation that, on February 8, 1996, became the Telecommunications Act of 1996. This law was enacted to spur competition in the telephone and cable industries and to foster the development of new electronic media.

Section 201 of the 1996 Act specifies the basic terms under which digital television will move forward. Existing broadcasters are assigned a new DTV license and an additional 6 MHz channel to facilitate the transition from analog to digital television. They retain their original 6

MHz channel for analog broadcasts until the expected completion of the transition, at which time the channels are returned to the FCC.¹⁵

DTV licensees are granted great flexibility in how they use their new spectrum, provided that uses do not interfere with the provision of over-the-air television programming. DTV licensees are still bound by the public interest standards that apply to broadcast television. Finally, DTV licensees are to pay the Federal Government a fee for ancillary and supplementary (subscription) DTV services. In requiring fees for these envisioned services, Congress sought to ensure that broadcasters would pay approximately what they might have paid had the spectrum been auctioned, for any subscription services (as opposed to free over-the-air programming).¹⁶ This way, the public would receive some portion of the value of the spectrum assigned to broadcasters. On November 19, 1998, the FCC adopted rules that require broadcasters to pay a fee of 5 percent of gross revenues received from ancillary or supplementary uses of the digital television spectrum for which they charge subscription fees or other specified compensation.¹⁷ On the same day, the FCC issued a Notice of Proposed Rulemaking inviting comment on whether noncommercial broadcasters should be able to use their excess digital capacity for revenue-enhancing ancillary or supplementary services, and if so, whether they should be exempt from the 5 percent fee.¹⁸

In moving to a digital format, the FCC, broadcasters, public-interest organizations, and others agreed that it is important to ensure that free, over-the-air television remains universally available to the American people. The grant of free transitional spectrum to broadcasters for DTV was seen as a way to ensure that over-the-air television would continue to be universally available in the future. It was also meant to ensure that commercial broadcasting would remain competitive and that public broadcasting would remain a vital noncommercial venue.

By giving broadcasters use of the airwaves until at least 2006, rather than auctioning the spectrum or charging a fee, the Federal Government hoped to ease the transition to digital television. Broadcasters would have time to make considerable investments in new digital equipment and make strategic and operational changes; television set manufacturers would have time to develop and improve new products and lower prices; and consumers would have time to buy new sets.

To help broadcasters meet the transition deadline of December 31, 2006, the FCC established an accelerated schedule for the introduction of DTV so that all Americans could have access to it by the year 2002.¹⁹ Affiliates of the top four networks (ABC, CBS, NBC, and Fox) in the top-10 markets must have a digital signal on the air by May 1, 1999. The same network affiliates in markets 11 through 30 must be on the air by November 1, 1999. All other commercial stations must be on the air by May 1, 2002.

According to FCC Chairman William E. Kennard, at the beginning of November 1998, 42 stations were broadcasting digital television.²⁰ Thus, digital television signals will be available to more than one-third of television households in the United States by year's end, and the

National Association of Broadcasters expects this coverage to rise to 50 percent by the end of 1999. Total DTV coverage for commercial stations is intended to be available by 2002.

When Congress passed the Balanced Budget Act of 1997, it specified that broadcasters will be permitted to keep their analog television service beyond 2006 under two conditions:

1. If one or more of the largest television stations in a market do not begin DTV transmission by the 2006 deadline through no fault of their own; or
2. If fewer than 85 percent of the television households in a market are able to receive digital television signals (either off the air or through a cable-type service that includes DTV stations).²¹

CHALLENGES THAT REMAIN

The advent of digital television will bring remarkable, exciting changes to broadcasting. Consumers will have many more choices from broadcast television, from sharp high-definition television programming and multicasting of niche-audience channels to new information services and computer-interactivity. Broadcasters will have new opportunities to develop innovative programming and services, along with new revenue streams and market franchises. DTV will help broadcasting evolve and compete in the new media environment, while ensuring that public interest needs are still met through over-the-air broadcasting.

Still, resolving the issues that surround digital television will take time. The next section reviews some of the more significant issues that need to be addressed.

What Kinds of DTV Programming and Services to Offer?

Because of the inherent versatility of digital transmissions and the still-evolving terms of market competition, how broadcasters will use their digital signals is unclear. One of the first-threshold choices broadcasters must make is whether to transmit HDTV programming, multicast, datacast, or to employ some combination of the these.

A survey conducted by the Harris Corporation, a provider of broadcast and radio equipment, found that as recently as December 1997, 44 percent of broadcasters were not sure exactly what they would do with DTV programming.²² Some 33 percent said they planned to offer multicasting; another 23 percent said they definitely would offer high-definition television. For those broadcasters who will use high-definition television, most plan to do so during primetime, but not during other times of the day.²³ Of the broadcasters who plan to multicast, 50 percent predicted they would offer news and regular network programming; 47 percent said they planned to transmit information services; and 26 percent planned to air local news and public affairs. Two of the more significant findings of the Harris survey were that broadcasters will move to local digital program origination *faster* than generally anticipated, and that they expect to offer more locally produced news with DTV.

Some observers caution that the ways in which DTV will interact with media markets will be highly unpredictable for many years. Although it is likely that multicasting will be economically feasible for some types of programs and dayparts, no clear models exist for attracting and keeping viewers tuned in regularly in a multicasting environment. Nor is it clear how interactive services will be treated under must-carry rules.

Questions remain on how much revenue the new channels—whether HDTV, SDTV, or data—can actually generate. Will broadcasters cannibalize their primary signals as they pursue new DTV opportunities, or will they expand their franchises?²⁴ Furthermore, anticipating the nature of DTV programming and services is made complex by the new competition among different media, especially cable, direct broadcast satellite, and the Internet. Digital television offerings may also be affected by new ownership patterns for television broadcasting, which in turn might blur the boundaries between once-distinct media. Some broadcasting experts speculate that information providers may see television stations as distribution vehicles for their data, which may encourage new corporate owners to acquire broadcast stations.²⁵

Technical Issues

Only a few technical problems stand in the way of a full rollout of digital television. The broadcast and cable industries have agreed to channel numbering for virtual channels with multicasting.²⁶ A consensus standard for ensuring that DTV is technically compatible with cable television systems, through which 65 percent of Americans receive television programming, is still under construction.²⁷

Investment Costs

The December 1997 Harris Corporation's survey of broadcasters suggested that the average cost to broadcasters of converting to digital would be in the vicinity of \$5.7 million. This sum is "soft" in the sense that television stations that serve the larger urban markets will likely bear greater expenses than smaller stations. The timing of purchase of DTV equipment will make a significant difference as well. In addition, the kinds and amount of equipment that stations choose to buy for local origination of DTV programming can vary immensely. For all these reasons, previous estimates of DTV conversion costs of \$6 million to \$10 million per station are expected to decline rapidly, probably even faster than the 20 percent annual price decrease that now prevails.²⁸

Consumer Demand for DTV

Another uncertain variable is how quickly consumers will see value in DTV programming and services, and choose to buy DTV sets. Perhaps the most significant factor here is the cost of DTV sets. Original projections by manufacturers indicate that the new television sets will cost between \$1,000 to \$1,500 more than conventional high-end projection sets, or about \$4,000 to \$5,000.²⁹

The first high-definition television sets offered for sale in September 1998 were, however, priced at \$8,000; about 100,000 are expected to be manufactured in 1998³⁰—out of a universe of more than 24 million conventional sets expected to be sold in 1998. A Samsung Electronics Company official estimates that HDTV sets will sell for \$3,000 by the year 2002, considerably higher than the \$500 or less that most Americans now pay for new television sets.³¹ But as new digital programming and services become more plentiful, it is expected that consumer demand for DTV sets will rise and set prices will decline.

Must-Carry Regulations

Before digital television becomes fully operational, several regulatory issues must be resolved. One of the most important is clarifying how the must-carry provisions of the Telecommunications Act will apply to digital television.³² Historically, cable television systems have had to carry the signal of local broadcasters, as mandated by the 1992 Cable Act and affirmed in the 1997 Supreme Court ruling of *Turner Broadcasting System, Inc. v. FCC* ("Turner II").³³ The arrival of digital television transmission raises questions about how must-carry precedents should apply in the new television environment. Should cable systems be obliged to carry both the analog and digital television signals during the transition period, or only the analog signal, as they have under the existing must-carry rules? When cable systems do carry the digital signal, should they be obliged to carry the same amount of *bandwidth* as they currently do, even though that same spectrum may be carrying several programming channels and perhaps subscriber-based services? Do analog and digital broadcasts constitute separate "broadcasting stations" for the purposes of retransmission consent and digital broadcast signal carriage?

Resolving must-carry and retransmission consent requirements will affect the kind of access that cable households will have to digital television signals, what stations and channels are available over cable systems, and the rates that subscribers will have to pay. There is also concern about how must-carry rules in the new DTV environment might affect noncommercial video sources such as the Public Broadcasting System, and public affairs and public access cable channels. To help it address the must-carry/retransmission consent issue, the FCC released a Notice of Proposed Rulemaking on July 10, 1998, which proposes seven alternatives for implementing the must-carry provisions of the Telecommunications Act.³⁴

Siting and Construction of DTV Towers

Another pending Notice of Proposed Rulemaking invites comment on whether Federal law should allow the preemption of local zoning rules to facilitate the siting and construction of digital broadcast towers.³⁵ This proceeding was initiated in August 1997 in response to a petition by the National Association of Broadcasters, which expressed concern that the local approval process for new towers could take too long and delay the introduction of DTV.³⁶

Public Interest Obligations

Finally, one of the largest unresolved issues is what public interest obligations should govern digital broadcasters in the new media marketplace. In the Telecommunications Act of 1996,

Congress specified that broadcasters would continue to serve as trustees of the public's airwaves and that public interest obligations should extend into the digital television environment:

Nothing in this section shall be construed as relieving a television broadcasting station from its obligation to serve the public interest, convenience, and necessity. In the Commission's review of any application for renewal of a broadcast license for a television station that provides ancillary or supplementary services, the television licensee shall establish that all of its program services on the existing or advanced television spectrum are in the public interest.³⁷

Although Congress' general intent is clear, the substantive meaning of public interest obligations in the new television environment is likely to change. To determine the precise contours of a DTV licensee's public interest obligations, the FCC plans to initiate a rulemaking in the near future. This process will be enhanced by understanding the historical development of the public interest standard in broadcasting, which is the focus of Section II of this Report. This is followed in Section III by the Advisory Committee's formal recommendations.

For all the challenges that remain, the opportunities to build a new, more robust broadcasting system have never been greater. The sheer technological capabilities of DTV offer sweeping possibilities for program creativity as well as for the increased competitiveness of broadcasting and public interest service. The most important task at hand is to devise the most appropriate structures to facilitate all these goals.

ENDNOTES

- ¹ DTV is often referred to as "advanced television," or ATV. Because ATV embraces any enhancements to the existing television format (known as the NTSC standard, for National Television Systems Committee), ATV is a more inclusive term than "digital television" or "high-definition television." Once digital technology proved feasible and the most desirable technical standard for advanced television, the term DTV became virtually synonymous with ATV. See, e.g., *In the Matter of Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service*, Notice of Proposed Rule Making, 6 FCC Rcd 7024 n.1 (discussing the definition of "ATV"). See also, *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, Fourth Report and Order, 11 FCC Rcd 17771, 17773 (1996) (discussing the introduction of the term "DTV") (*Fourth Report and Order*).
- ² Telecommunications Act of 1996, P.L. 104-104, 110 Stat. 56 (codified at 47 U.S.C. 151 et. seq.) (Feb. 8, 1996). This Act amended the Communications Act of 1934. See 47 U.S.C. §§ 336, 309(j) (1998).
- ³ 47 U.S.C. §336 (allowing the FCC to determine, with only general guidance, whether to issue additional licenses for advanced television services).
- ⁴ *In the Matter of Advanced Television Systems and Their Impact on the Existing Television Broadcast Service*, Notice of Inquiry, 2 FCC Rcd 5125, 5126 (1987) (*Notice of Inquiry on ATV*)